AMENDMENTS TO THE CLAIMS:

1. (Cancelled)

2. (Previously Amended) The apparatus of claim 3, wherein said structure comprises a silicon or carbon material.

3. (Currently Amended) A nanometer scale apparatus, comprising:

an elongated structure with nanometer cross-sectional dimensions; and

a device comprising components substantially on opposite sides of the elongated structure, said components applying an electric field across them to the elongated structure in a direction transverse to the elongated structure so that an electronic energy band structure of the elongated structure is modulated without substantially moving any portion of the elongated structure, wherein said electric field is not less than about 1 MV/m.

4. (Previously Amended) The apparatus of claim 3, wherein said components comprise at least one nanotube or nanowire.

5. (Previously Amended) The apparatus of claim 3, wherein said components comprise at least one multiple wall nanotube.

6. (Previously Amended) The apparatus of claim 3, wherein said components comprise two elongated nanotubes or nanowires oriented in directions transverse to the elongated structure and applying the electric field to a portion of the elongated structure at a location between and overlapping the two nanotubes or nanowires of the components, thereby forming a cross junction arrangement with the elongated structure.

7. (Previously Amended) The apparatus of claim 3, further comprising a dielectric material between the components and the elongated structure.

8. (Previously Amended) The apparatus of claim 3, wherein said structure comprises at least one multiple wall nanotube.

9. (Previously Amended) The apparatus of claim 3, wherein said structure comprises at least one zigzag carbon nanotube.

10. (Previously Amended) The apparatus of claim 3, wherein said electric field causes change in electrical conductance of the elongated structure by redistributing electrical charge on the elongated structure without changing net electrical charge on the elongated structure.

11. (Previously Amended) The apparatus of claim 3, wherein said structure comprises at least one semiconducting nanotube or nanowire.

12. (Previously Amended) The apparatus of claim 3, wherein said change in energy band structure also causes a change in electrical conductance of the elongated structure.

13. (Previously Amended) The apparatus of claim 3, wherein said change in energy band structure also causes a shift in optical energy absorption wavelength characteristics by the elongated structure.

14. (Previously Amended) The apparatus of claim 3, wherein said components applies the electric field to a section of the elongated structure, so that the change in energy band structure caused by the field also causes a quantum well to develop at or near the section of the elongated structure.

15. (Previously Amended) The apparatus of claim 3, wherein said components apply electric field(s) to two or more sections of the elongated structure, wherein said sections are spaced apart from one another, so that the change in energy band structure

caused by the field also causes a number of quantum wells to develop at or near the sections of the elongated structure.

16. (Original) The apparatus of claim 15, wherein said sections are spaced apart from one another by spacings selected such that the elongated structure reflects electromagnetic radiation of wavelengths that are functions of the spacings.

17. (Previously Amended) The apparatus of claim 3, wherein said components apply the electric field to the elongated structure so that there is an electric field gradient across the elongated structure.

18. (Previously Amended) A nanometer scale transistor apparatus, comprising:

an elongated structure with nanometer cross-sectional dimensions;

a device comprising components substantially on opposite sides of the elongated structure, said components applying an electric field across them to the elongated structure in a direction transverse to the elongated structure so that electrical conductance of the elongated structure is altered by modulating an electronic energy band structure of the elongated structure, wherein said electric field is not less than about 1 MV/m; and

a source and a drain electrically connected to the elongated structure.

19. (Original) The apparatus of claim 18, further comprising a dielectric material between the components and the elongated structure.

20. (Original) The apparatus of claim 18, wherein said components comprise two elongated nanotubes or nanowires oriented in directions transverse to the elongated structure and applying the electric field to a portion of the elongated structure at a location between and overlapping the two nanotubes or nanowires of the components, thereby forming a cross junction arrangement with the elongated structure.

21. (Original) The apparatus of claim 18, wherein said components comprise at least one multiple wall nanotube.

22. (Currently Amended) A nanometer scale photodetector apparatus, comprising:

an elongated structure with nanometer cross-sectional dimensions;

a device comprising components substantially on opposite sides of the elongated structure, said components applying an electric field across them to the elongated structure in a direction transverse to the elongated structure to cause a shift in optical energy absorption wavelength characteristics by the elongated structure by modulating an electronic energy band structure of the elongated structure without substantially moving any portion of the elongated structure, wherein said electric field is not less than about 1 MV/m; and

two electrical terminals electrically connected to the elongated structure.

23. (Original) The apparatus of claim 22, said device further comprising a voltage source applying an electrical potential across said components, said source being tunable to select wavelength of radiation that is absorbed by the elongated structure.

24. (Previously Amended) A nanometer scale polaron apparatus, comprising:

an elongated structure with nanometer cross-sectional dimensions;

a device comprising components substantially on opposite sides of the elongated structure, said components applying an electric field across them to a portion of the elongated structure in a direction transverse to the elongated structure to modulate an electronic energy band structure of the portion of the elongated structure, wherein said electric field is not less than about 1 MV/m; and

a source providing radiation to the portion to cause a change in length of the elongated structure.

25. (Previously Amended) A nanometer scale radiation reflector apparatus, comprising:

an elongated structure with nanometer cross-sectional dimensions; and

a device comprising components substantially on opposite sides of the elongated structure, said components applying an electric field across them to a portion of the elongated structure in a direction transverse to the elongated structure to cause a plurality of quantum wells along a length of the elongated structure by modulating an electronic energy band structure of the elongated structure, said wells being spaced apart by spacings selected to reflect radiation of predetermined wavelengths, wherein said electric field is not less than about 1 MV/m.

26. (Original) The apparatus of claim 25, said device further comprising a plurality of pairs of elongated electrodes, each pair located substantially on opposite sides of the elongated structure and oriented in directions transverse to the elongated structure, the spacing between each pair of electrodes selected to reflect radiation of predetermined wavelengths.

27. (Previously Amended) A nanometer scale laser apparatus, comprising:

a optical gain region;

one or more elongated structure(s) on one or more than one side of the region, each of said structure(s) having nanometer cross-sectional dimensions;

a device comprising components substantially on opposite sides of each of the one or more structure(s), said components applying an electric field across them to a portion of each of the one or more structure(s) in a direction transverse to such structure to cause one or more quantum wells in such structure by modulating an electronic energy band structure of the elongated structure, wherein said electric field is not less than about 1 MV/m; and

an instrument causing electrons and holes to be injected into the region.

28. (Original) The apparatus of claim 27, said components comprising a pair of elongated electrodes located substantially on opposite sides of the elongated structure and oriented in directions substantially along a length of the elongated structure.

29. (Previously Amended) A nanometer scale quantum computing apparatus, comprising:

an elongated structure with nanometer cross-sectional dimensions; and

a device comprising components substantially on opposite sides of the elongated structure, said components applying an electric field across them to a portion of the elongated structure in a direction transverse to the elongated structure to cause a plurality of quantum wells adjacent to one another along a length of the elongated structure by modulating an electronic energy band structure of the elongated structure, said wells trapping ions, wherein said electric field is not less than about 1 MV/m,

a source supplying radiation to at least one of the wells; and

an ion tip in the vicinity of the at least one of the wells, causing a change in state of ions in such well when radiation is supplied to such well, and detecting the state of ions in such well when radiation is not supplied to such well.

30. (Previously Amended) A nanometer scale apparatus, comprising:

an elongated structure with nanometer cross-sectional dimensions; and

a device that causes an electrical potential gradient to develop around a perimeter of the elongated structure so that an electronic energy band structure of the elongated structure is modulated, wherein the electrical potential gradient causes an electric field of not less than about 1 MV/m across the structure.

31. (Previously presented) The apparatus of claim 3, said structure comprising a crystalline material.

32. (Previously presented) The apparatus of claim 3, wherein said electric field causes a band gap of the electronic energy band structure to become narrower.

33. (Previously presented) The apparatus of claim 18, said structure comprising a crystalline material.

34. (Previously presented) The apparatus of claim 18, wherein said electric field causes a band gap of the electronic energy band structure to become narrower.

35. (Previously presented) The apparatus of claim 30, said structure comprising a crystalline material.

36. (Previously presented) The apparatus of claim 30, wherein said electric field causes a band gap of the electronic energy band structure to become narrower.

37. (Previously presented) The apparatus of claim 3, said structure comprising a homogeneous material throughout the structure.

38. (Previously presented) The apparatus of claim 18, said structure comprising a homogeneous material.

39. (Previously presented) The apparatus of claim 30, said structure comprising a homogeneous material.

40. (New) The apparatus of claim 22, said elongated structure comprising substantially the same material throughout the structure.

41. (New) The apparatus of claim 22, wherein said structure comprises at least one nanotube or nanowire.

42. (New) A nanometer scale apparatus, comprising:

an elongated structure with nanometer cross-sectional dimensions, said structure comprising at least one nanotube or nanowire; and

a device comprising components substantially on opposite sides of the elongated structure, said components applying an electric field across them to the elongated structure in a direction transverse to the elongated structure so that an electronic energy band structure of the elongated structure is modulated, wherein said electric field is not less than about 1 MV/m.

43. (New) The apparatus of claim 3, wherein said components comprise at least one nanotube or nanowire.

44. (New) The apparatus of claim 42, wherein said components comprise at least one multiple wall nanotube.

45. (New) The apparatus of claim 42, wherein said components comprise two elongated nanotubes or nanowires oriented in directions transverse to the elongated structure and applying the electric field to a portion of the elongated structure at a location between and overlapping the two nanotubes or nanowires of the components, thereby forming a cross junction arrangement with the elongated structure.

46. (New) The apparatus of claim 42, further comprising a dielectric material between the components and the elongated structure.

47. (New) The apparatus of claim 42, wherein said structure comprises at least one multiple wall nanotube.

48. (New) The apparatus of claim 42, wherein said structure comprises at least one zigzag carbon nanotube.

49. (New) The apparatus of claim 42, wherein said electric field causes change in electrical conductance of the elongated structure by redistributing electrical charge on the elongated structure without changing net electrical charge on the elongated structure.

50. (New) The apparatus of claim 42, wherein said structure comprises at least one semiconducting nanotube or nanowire.

51. (New) The apparatus of claim 42, wherein said change in energy band structure also causes a change in electrical conductance of the elongated structure.

52. (New) The apparatus of claim 42, wherein said change in energy band structure also causes a shift in optical energy absorption wavelength characteristics by the elongated structure.

53. (New) The apparatus of claim 42, wherein said components applies the electric field to a section of the elongated structure, so that the change in energy band structure caused by the field also causes a quantum well to develop at or near the section of the elongated structure.

54. (New) The apparatus of claim 42, wherein said components apply electric field(s) to two or more sections of the elongated structure, wherein said sections are spaced apart from one another, so that the change in energy band structure caused by the field also causes a number of quantum wells to develop at or near the sections of the elongated structure.

55. (New) The apparatus of claim 54, wherein said sections are spaced apart from one another by spacings selected such that the elongated structure reflects electromagnetic radiation of wavelengths that are functions of the spacings.

56. (New) The apparatus of claim 42, wherein said components apply the electric field to the elongated structure so that there is an electric field gradient across the elongated structure.

57. (New) The apparatus of claim 42, said structure comprising a crystalline material.

58. (New) The apparatus of claim 42, wherein said electric field causes a band gap of the electronic energy band structure to become narrower.

59. (New) The apparatus of claim 42, said structure comprising a homogeneous material.

60. (New) A nanometer scale photodetector apparatus, comprising:
an elongated structure with nanometer cross-sectional dimensions, wherein said structure comprises at least one nanotube or nanowire;

a device comprising components substantially on opposite sides of the elongated structure, said components applying an electric field across them to the elongated structure in a direction transverse to the elongated structure to cause a shift in optical energy absorption wavelength characteristics by the elongated structure by modulating an electronic energy band structure of the elongated structure, wherein said electric field is not less than about 1 MV/m; and

two electrical terminals electrically connected to the elongated structure.